**Genetics Problems: Blood Groups**

**Multiple Choice Question 1**

The ABO blood group system is controlled by an autosomal gene that has the alleles IA, IB and i. With respect to this blood group, one can reasonably claim that:

1. Six different phenotypes are possible in a population
2. Six different genotypes are possible in a population
3. Each individual has three alleles for this gene
4. The phenotype blood group A is dominant over blood group B

**Short Answer Question 1**

Mrs. Doe and Mrs. Roe had babies at the same hospital at the same time. Mrs. Roe went home with a girl she called Nancy. Mrs Doe took home a boy she called Richard, although she thought she had given birth to a girl. Mrs. Doe sued the hospital, so they did blood tests, with the following results:

Mr. Doe-------------O

Mrs. Doe------------AB

Mr. & Mrs. Roe----B

Nancy----------------A

Richard--------------O

By showing the genetics involved, explain why you think Mrs. Doe would, or would not, win her case.

**Short Answer Question 2**

A couple have two children with blood groups O and AB respectively.

1. What are the genotypes and phenotypes of the parents?
2. The woman has another baby of blood group B. The male denies fatherhood of the third child. Does the evidence of blood group B support his claim? Explain.

Tests were also carried out on the MN blood group of the individuals concerned. This blood group has the alleles LM and LN. The third child was group M (LM LM) and the father was group N.

1. Could this information regarding the MN blood groups support the man’s claim?\*

**Answers**

**Multiple Choice Question 1**

B – IAIA, IBIB, ii, IAIB IAi, IBi

Can’t be A as there are only 4 phenotypes – A, B, O, AB

Can’t be C as an individual can only ever have 2 alleles for a gene

Can’t be D as A and B are codominant

**Short Answer Question 1**

Mr. Doe – ii

Mrs. Doe - IAIB

Phenotypes of possible offspring: A or B

Can’t have given birth to Richard – therefore she would win her case

Mr. & Mrs. Roe – IBIB or IBi

Phenotypes of possible offspring: B or O

Can’t have given birth to Nancy – therefore Mrs. Doe would win her case

**Short Answer Question 2**

a. IAi (blood group A) and IBi (blood group B)

b. No evidence to support this – the child could have inherited IB and I alleles from the parents, making them blood group B.

c. Yes, because the child would require an LM allele from each parent, which is not possible if the father is group N.